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$$\varepsilon_{13} = -\sum_{\alpha} \frac{2\pi\Omega_{\alpha}^{2}}{\omega\omega_{H\alpha}} \sum_{s=-\infty}^{\infty} \int v_{\perp} dv_{\perp} v_{\parallel} dv_{\parallel} \frac{R_{\alpha} J_{s}^{2}}{a(s+b)},$$

$$\varepsilon_{23} = \sum_{\alpha} \frac{2\pi\Omega_{\alpha}^{2} i}{\omega\omega_{H\alpha}} \sum_{s=-\infty}^{\infty} \int v_{\perp} dv_{\perp} v_{\parallel} dv_{\parallel} \frac{R_{\alpha} J_{s} J_{s}'}{s+b}, \qquad (2.3)$$

$$\Omega_{\alpha}^{2} = \frac{4\pi e^{2} n_{0\alpha}}{m_{\alpha}}, \quad \omega_{H\alpha} = \frac{e_{\alpha} H_{0}}{m_{\alpha} c}, \quad a = \frac{k_{\perp} v_{\perp}}{\omega_{H\alpha}}, \quad b = \frac{k_{\parallel} v_{\parallel} - \omega}{\omega_{H\alpha}},$$

$$R_{\alpha} = \frac{\omega_{H\alpha}}{\omega}\left(-b \frac{\partial f_{0\alpha}}{\partial v_{\perp}} + \operatorname{ctg}\theta\, a \frac{\partial f_{0\alpha}}{\partial v_{\parallel}}\right),$$

$J_s = J_s(a)$ is a Bessel function, $J_s' = J_s'(a)$ is its derivative, $n_{0\alpha}$ and $f_{0\alpha}$ are the density and equilibrium function of the distribution of the particles of the kind α. The functions $f_{0\alpha}$ depend on $v_{\perp}$ and $v_{\parallel}$ ($v_{\perp}$ and $v_{\parallel}$ are the components of particle velocity which are perpendicular and/or parallel to H_0. The summation in (2.3) is carried out over all kinds of beam particles

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in the plasma. The integration of $d v_{\parallel}$ is from $-\infty$ to $+\infty$. Eq. (2.3)(2.3) may be obtained also when using the general equation for ε_{ij} (obtained by V. D. Shafranov). The tensor ε_{ij} is represented in the form $\varepsilon_{ij} = \varepsilon_{ij}^{(0)} + \varepsilon'_{ij}$ (2.4), where $\varepsilon_{ij}^{(0)}$ denotes the tensor of the dielectric constant of the "cold" plasma, whose components are given by (2.5):

$$\varepsilon_{xx}^{(0)} = \varepsilon_{yy}^{(0)} = 1 - \sum_{\alpha} \frac{\Omega_{\alpha}^{2}}{\omega^{2} - \omega_{H\alpha}^{2}}, \quad \varepsilon_{zz}^{(0)} = 1 - \sum_{\alpha} \frac{\Omega_{\alpha}^{2}}{\omega^{2}},$$
$$\varepsilon_{xy}^{(0)} = -\sum_{\alpha} \frac{i\Omega_{\alpha}^{2}\omega_{H\alpha}}{\omega(\omega^{2} - \omega_{H\alpha}^{2})}, \quad \varepsilon_{xz}^{(0)} = \varepsilon_{yz}^{(0)} = 0. \qquad (2,5)$$

The summand ε'_{ij} is due to the presence of the beam. Should the inequalities $k_{\parallel}^{2}(v_{\parallel} - v_{0})^{2} \ll (\omega - s\omega_{H\alpha} - k_{\parallel}v_{0})^{2}$ and $k_{\perp}v_{\perp} \ll |\omega_{H\alpha}|$ hold, if $v_{0} = \bar{v}_{\parallel}$ is the drift velocity of the beam, the thermal motion of the particles need not be taken into account, where (2.6)

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$$
\left.
\begin{aligned}
\varepsilon'_{11} &= \varepsilon'_{22} = -\sum_{\alpha} \frac{\Omega'^2_{\alpha}(\omega - k_{\parallel} v_{\alpha})^2}{\omega^2\left[(\omega - k_{\parallel} v_{\alpha})^2 - \omega^2_{H\alpha}\right]},\\
\varepsilon'_{33} &= -\sum_{\alpha} \frac{\Omega'^2_{\alpha}}{\omega^2}\left[\frac{\omega^2}{(\omega - k_{\parallel} v_{\alpha})^2} + \frac{(k_{\perp} v_{\alpha})^2}{(\omega - k_{\parallel} v_{\alpha})^2 - \omega^2_{H\alpha}}\right],\\
\varepsilon'_{12} &= -\sum_{\alpha} \frac{i\Omega'^2_{\alpha}(\omega - k_{\parallel} v_{\alpha})\,\omega'_{H\alpha}}{\omega^2\left[(\omega - k_{\parallel} v_{\alpha})^2 - \omega^2_{H\alpha}\right]},\\
\varepsilon'_{13} &= -\sum_{\alpha} \frac{\Omega'^2_{\alpha}(\omega - k_{\parallel} v_{\alpha})\,k_{\perp} v_{\alpha}}{\omega^2\left[(\omega - k_{\parallel} v_{\alpha})^2 - \omega^2_{H\alpha}\right]},\\
\varepsilon'_{23} &= \sum_{\alpha} \frac{i\Omega'^2_{\alpha}\,\omega'_{H\alpha}\,k_{\perp} v_{\alpha}}{\omega^2\left[(\omega - k_{\parallel} v_{\alpha})^2 - \omega^2_{H\alpha}\right]},
\end{aligned}
\right\}
\qquad (2,6)
$$

and the cross bar denote that the respective quantity refers to the beam. For studying the effect of thermal leakage of the beam particles by excitement of the waves of the plasma, the equilibrium function of the beam

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particle distribution is chosen in the form

$$f_{0\alpha} = \frac{1}{(2\pi)^{3/2} v^3_{T,\alpha}} \exp\left[-\frac{v_\perp^2 + (v_\parallel - v_0)^2}{2v^2_{T,\alpha}}\right], \quad v^2_{T,\alpha} = \frac{T_\alpha}{m_\alpha} \qquad (2.7)$$

where the tensor ε'_{ij} assumes the form

$$\varepsilon'_{11} = \sum_{\alpha,s} \frac{\Omega_\alpha^2}{\omega^2} z_0 e^{-\mu} I_s \frac{s^2}{\mu} i\sqrt{\pi} w(z_s),$$

$$\varepsilon'_{22} = \sum_{\alpha,s} \frac{\Omega_\alpha^2}{\omega^2} z_0 e^{-\mu} \left[\left(\frac{s^2}{\mu} + 2\mu\right) I_s - 2\mu I'_s\right] i\sqrt{\pi} w(z_s),$$

$$\varepsilon'_{33} = \sum_\alpha \frac{2\Omega_\alpha^2}{\omega^2} \left[y_0^2 + \sum_s z_0 e^{-\mu} I_s y_s^2 i\sqrt{\pi} w(z_s)\right],$$

$$\varepsilon'_{12} = \sum_{\alpha,s} \frac{\Omega_\alpha^2}{\omega^2} z_0 e^{-\mu} s (I_s - I'_s) \sqrt{\pi} w(z_s),$$

$$\varepsilon'_{13} = \sum_{\alpha,s} \frac{\Omega_\alpha^2}{\omega^2} z_0 e^{-\mu} I_s \frac{s y_s}{\sqrt{\mu}} i\sqrt{2\pi} w(z_s),$$

$$\varepsilon'_{23} = \sum_{\alpha,s} \frac{\Omega_\alpha^2}{\omega^2} z_0 e^{-\mu} \sqrt{\mu} (I'_s - I_s) y_s \sqrt{2\pi} w(z_s), \qquad (2.8)$$

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where $I_s = I_s(\mu)$ is a modified Bessel function, $I'_s = dI_s/d\mu$, $\sqrt{\mu} = k_\perp v_{h.n}/\omega'_{H\alpha}$, $z_s = (\omega - s\omega'_H - k_\parallel v_0)/\sqrt{2}k_\parallel v_{h\alpha}$, $y_s = (\omega - s\omega'_{H\alpha})/\sqrt{2}k_\parallel v_{h\alpha}$, and $w(z_s)$ is the probability integral. In the further course of the work, equations are derived for the electron longitudinal oscillations, the quasi-longitudinal propagation as well as the ion-cyclotron and magnetohydrodynamic waves. Mention is made of A. I. Akhivezer, V. V. Zheleznyakov, Ya. B. Faynberg, and V. P. Dokuchayev. A. I. Akhiyezer and V. F. Aleksin are thanked for discussion and valuable advice. There are 12 references: 10 Soviet-bloc and 2 non-Soviet-bloc.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR, Khar'kov (Institute of Physics and Technology AS UkrSSR, Khar'kov)

SUBMITTED: May 9, 1960

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B020/B067

26.2330
24.2120 (1482, 1502, 1160)

AUTHORS: Kitsenko, A. B. and Stepanov, K. N.

TITLE: Cyclotron instability in plasma

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 2, 1961, 176-179

TEXT: It is known that the anisotropy of the equilibrium distribution of plasma electrons and ions with respect to velocity may lead to instabilities. The present paper deals with the instability of an unbounded plasma in a homogeneous magnetic field H_0 if ions with an equilibrium distribution function of the form (1)

$$z_s = \frac{\omega_j - k_z v_0 + s|\omega_H|}{}.$$

occur in the plasma, where n_0 the density of the ions, $v_\perp$ and $v_\parallel$ the perpendicular and parallel components, respectively, of the ion velocity. The ions with the distribution function (1) have the same Larmor radius $r_0 = v_0/\omega_H$, where $\omega_H = eH_0/Mc$ and M the mass of the ion. It is demonstrated

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that disturbances of a wavelength of the order of r_0 and frequencies which are equal to or a multiple of the gyrofrequency ω_H are unstable (cyclotron instability). The order of magnitude of the growth increment is equal for the first harmonics. It may be expected that the results obtained for an unbounded plasma will be qualitatively also correct for adiabatic traps. First, the case is studied where the thermal scattering of ion velocities parallel to H_0 can be neglected. Hence, it may be assumed that $f_0(v_\parallel) = \delta(v_\parallel)$. The tensor of the dielectric constant in this case has form (2),

$$\left.\begin{aligned} \varepsilon_{11} &= -\frac{\Omega^2}{\omega^2}\left[1 + \sum_{n=-\infty}^{\infty}\left(\frac{2\omega_H n^2 J_n J_n'}{(\omega' - n\omega_H)a} + \frac{\mathrm{ctg}^2\theta\,\omega_H^2 n^2 J_n^2}{(\omega' - n\omega_H)^2}\right)\right], \\ \varepsilon_{22} &= -\frac{\Omega^2}{\omega^2}\left[1 + \sum_{n=-\infty}^{\infty}\left(\frac{\omega_H n\left(a^2 J_n'^2\right)'}{(\omega' - n\omega_H)a} + \frac{\mathrm{ctg}^2\theta\,\omega_H^2 n^2 J_n'^2}{(\omega' - n\omega_H)^2}\right)\right], \end{aligned}\right\} \quad (2)$$

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$$
\left.
\begin{aligned}
\varepsilon_{33} &= \varepsilon_{33}^{(0)} - \frac{\Omega^2}{\omega'^2},\\
\varepsilon_{12} &= -i\frac{\Omega^2}{\omega'}\sum_{n=-\infty}^{\infty}\left(\frac{\omega_H n^2 (e^{-a} I_n)'}{(\omega'-n\omega_H)\,a} + \frac{a\,\mathrm{tg}^2\theta\,\omega_H^2\, e^{-a} n I_n I_n'}{(\omega'-n\omega_H)^2}\right) - \frac{i\Omega^2}{\omega'\omega_H},\\
\varepsilon_{13} &= -\frac{\Omega^2}{\omega'}\sum_{n=-\infty}^{\infty}\frac{a\,\mathrm{tg}\,\theta\,\omega_H n\, e^{-a} I_n}{\omega'-n\omega_H},\\
\varepsilon_{23} &= i\frac{\Omega^2}{\omega'}\sum_{n=-\infty}^{\infty}\frac{a\,\mathrm{tg}\,\theta\,\omega_H a\, (e^{-a} I_n)'}{\omega'-n\omega_H},
\end{aligned}
\right\}
\quad (2)
$$

where $\Omega = (4\pi e^2 n_0/M)^{1/2}$ the Langmuir ion frequency, θ the angle between the wave vector $\vec{k}$ and $\vec{H}_0$; $k_{\parallel} = k\cos\theta$; $k_{\perp} = k\sin\theta$; $a = k_{\perp} r_0$; $I_n = I_n(a)$ a Bessel function; the prime denotes the differentiation with respect to a; $\omega' = \omega \mp i\gamma$ is the complex frequency. The axis 03 is parallel to $\vec{H}_0$, the axis 01 lies in the plane of the vectors $\vec{k}$ and $\vec{H}_0$. If the electrons have

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Maxwellian velocity distribution, (3) holds

$$\left.\begin{aligned} \varepsilon_{33}^{(e)} &= \frac{\Omega_e^2}{k_\parallel^2 v_e^2}\left[1 + i\sqrt{\pi}\, w(z_0)\right], \quad v_e^2 = \frac{T_e}{m}, \\ w(z_0) &= e^{-z_0^2}\left(\frac{-k_\parallel}{|k_\parallel|} + \frac{2i}{\sqrt{\pi}}\int_0^{z_0} e^{t^2}dt\right), \quad z_0 = \frac{\omega'}{\sqrt{2}\, k_\parallel v_e}, \end{aligned}\right\} \quad (3)$$

where Ω_e the Langmuir electron frequency. The solutions are then obtained for the dispersion relations for electromagnetic waves near $\omega_s = s\omega_H$ in the plasma (Ref. 1):

$$\omega' = \omega_s + \varepsilon, \ |\varepsilon| \ll \omega_H, \ s = 0, \pm 1, \pm 2, \quad (4).$$

If the quantity $a = k_\perp r_0$ is not too low and the number of the harmonics s not too high, the last summands for ε_{ij} in equation (2) $\sim 1/(\omega' - s\omega_H)^2$ are the highest. Taking account of this fact

$$\varepsilon^2 = -\frac{\Omega^4 \omega_H^2}{k_\perp^4 c^4}\left(s^2 J_s^2 + \cos^2\theta\, a^2 J_s'^2\right) + \frac{\Omega^2 k_\perp^2 v_e^2 J_s^2}{\Omega_e^2\left[1 + i\sqrt{\pi}\, z_0 w(z_0)\right]}. \quad (5)$$

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holds, where $z_e = \omega_s / \sqrt{2}\, k_{\parallel} v_e$. If $a \sim 1$, $|z_e| \sim v_0 / v_e$. If it appears from (5) that $\gamma = \mathrm{Im}\, t > 0$, the plasma is unstable. This is always the case when the first summand in (5) is greater than the second one, and also for $|z_e| \gg 1$, if (6).

$$\gamma^2 = -\varepsilon^2 = \frac{\Omega^2 \omega_0^2}{k_\perp^2 c^2}\left(\varepsilon^2 J_{1}'^2 + \cos^2\theta\, a^2 J_1^2\right) + \frac{\Omega^2 \omega_i^2 J_1^2}{\Omega_i^2}.$$

Finallly the case is dealt with where the thermal motion of the ions is essential. For reasons of simplicity, function $f_o(v_{\parallel})$ is assumed to be of Maxwellian type, i.e., (7)

$$f_0(v_{\parallel}) = \frac{1}{\sqrt{2\pi}\, v_i} \exp\left(-\frac{v_{\parallel}^2}{2 v_i^2}\right), \quad v_i^2 = \frac{T_i}{M}.$$

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In this case, the tensor ε_{ij} is determined by equations (8),

$$\varepsilon_{11} = -\frac{\Omega^2}{\omega^2}\left[1 - \frac{a^2}{2n} - \sum_{n=-\infty}^{\infty} i\sqrt{\pi}\, w(z_n)\left(\frac{z_0}{\beta} n^2 J_n^2 + 2n^2 J_n J_n' \frac{z_0 \omega_H}{\omega a}\right)\right],$$

$$\varepsilon_{22} = -\frac{\Omega^2}{\omega^2}\left[1 - \frac{a^2}{2n} - \sum_{n=-\infty}^{\infty} i\sqrt{\pi}\, w(z_n)\left(\frac{a^2 z_0}{\beta} J_n'^2 + \frac{2n\beta z_0}{\omega a}\left(a^2 J_n J_n'\right)'\right)\right],$$

$$\varepsilon_{33} = \operatorname{tg}^2\theta + \frac{\Omega^2}{\omega^2}\left[2z_0^2 + \frac{a^2 \operatorname{tg}^2\theta}{2n} + \operatorname{tg}^2\theta + \sum_{n=-\infty}^{\infty} 2i\sqrt{\pi}\, z_0^2\, w(z_n)\left(z_n J_n^2 + \frac{2n z_0 \omega_H}{\omega a} n J_n J_n'\right)\right],$$

$$\varepsilon_{12} = -\frac{\Omega}{\omega^2}\sum_{n=-\infty}^{\infty} \sqrt{\pi}\, w(z_n)\left[\frac{2n z_0 \omega_H}{\omega a}\left(a J_n J_n'\right) + \frac{z_0}{\beta} n a J_n J_n'\right] - \frac{i\Omega^2}{\omega\omega_H},$$

$$\varepsilon_{13} = \frac{\Omega^2}{\omega^2}\operatorname{tg}\theta\left[1 - \frac{a^2}{2n} + \sum_{n=-\infty}^{\infty} i\sqrt{\pi}\, z_n w(z_n)\left(\frac{2n^2 J_n J_n'}{a} + \frac{z_0\omega a}{z_0\beta\omega_H} J_n^2\right)\right],$$

$$\varepsilon_{23} = \frac{\Omega^2}{\omega^2}\sum_{n=-\infty}^{\infty} \operatorname{tg}\theta\, z_n w(z_n)\left[\frac{n}{a}\left(a J_n J_n'\right)' + \frac{\omega a [illegible]}{\beta z_0 \omega_H} J_n J_n'\right]. \qquad (8)$$

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The authors studied the occurrence of the instability for frequencies near ω_s. As may be seen from (5), the growth increment is small compared with the frequency if $v_0 \ll v_A$. For high-density plasmas, where $\Omega \gg \omega_H$, stronger instabilities occur in the case of disturbances with a wavelength of the order of r_0, for which growth frequency and increment are in the order of ω_H. In this case ω and γ can be determined only numerically.

There is 1 Soviet-bloc reference.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR, Khar'kov (Institute of Physics and Technology of the AS UkrSSR, Khar'kov)

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9.2572 (also 1532)
10.2000
24.6716

28781
S/057/61/031/010/015/015
B111/B112

AUTHOR: Kitsenko, A. B.

TITLE: Character of the instability in the interaction of a beam with plasma in an outer magnetic field

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 10, 1961, 1270 - 1271

TEXT: A convective instability can only be eliminated if its character is known. This article deals with the excitation of h-f longitudinal electron oscillations during the passage of a charged particle beam through plasma in an outer magnetic field. The resulting instability is convective in the absence of a magnetic field (Ref. 3, see below). A similar instability occurs in an outer magnetic field due to cyclotron excitation on the basis of the anomalous Doppler effect. This instability is investigated in the following. Integrals of the form $\int a(\vec{k})\, e^{i\vec{k}\vec{r} - i\omega t}\, d\vec{k}$ describe the electric and the magnetic field strength and can be used to distinguish between the absolute and the convective instability. If this integral tends to zero for any constant $\vec{r}$ with $t \to \infty$, the instability will be convective, and if it tends to infinity, it will be absolute. The integral X

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may also be written as $\int_C a\left[k(\omega)\right] \frac{e^{-i\omega t}}{\frac{d\omega}{dk}} d\omega$, where C is the mapping of the real axis of the k-plane on the ω plane. The values of $\omega = \omega_0$ for which $d\omega/dk = 0$, are found from the dispersion equation to be

$$\omega_0^2 = \omega_H^2\left(1 + \eta \pm \sqrt{(1+\eta)^2 - 4\cos^2\theta\,\eta}\right)/2\eta,$$

$\eta = \frac{\omega_H^2 - \Omega'^2}{\Omega^2}$, where ω_H is the electron cyclotron frequency; Ω and Ω' are the Langmuir frequencies of plasma and beam; θ is the angle between $\vec{H}_0$ and $\vec{K}$. The dispersion equation shows that C cuts the imaginary axis only in $\omega = 0$. The contour C can be deformed such that it lies in the lower semiplane ω, i.e., that the integral for $t \to \infty$ tends to zero. K. N. Stepanov, R. V. Polovin, and V. D. Shapiro are thanked for discussions. There are 5 references: 3 Soviet and 2 non-Soviet. Ref. 3: Ya. B. Faynberg et al., ZhTF, 31, 633, 1961. The two references to English-language publications read as follows: Ref. 1: P. A. Sturrock, Phys. Rev., 112, 1488, 1958; Ref. 2: P. A. Sturrock, Phys. Rev., 117,

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1426, 1960.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR Khar'kov (Physicotechnical Institute, AS UkrSSR, Khar'kov)

SUBMITTED: February 28, 1961

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25206
S/056/61/040/006/027/031
B125/B202

24.6714

AUTHORS: Akhiyezer, A. I., Kitsenko, A. B., Stepanov, K. N.

TITLE: Interaction between charged particle currents and low-frequency plasma oscillations

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 40, no. 6, 1961, 1866-1870

TEXT: The authors deal with the interaction between a compensated beam of charged particles and the low-frequency oscillations of a plasma (mainly with the magneto-acoustic waves and the Alfvèn waves) in a constant field in parallel direction to the beam and in the absence of collisions. If the plasma is rarefied to such an extent that the frequency ω of the oscillations is much higher than the frequency $1/\tau$ of the collisions, the plasma oscillations must be described on the basis of the kinetic equation. With $\omega\tau \ll 1$ the plasma can be described hydrodynamically. The authors studied the case $\omega\tau \gg 1$. The general dispersion equation for plasma oscillations in an external magnetic field with random distribution function of the particles with respect to the velocities

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reads as follows: $An^4 + Bn^2 + C = 0$ (1) where $n = kc/\omega$. The wave vector $\vec{k}$ and the quantities A, B, and C are determined by the components of the tensor of the dielectric constant ε_{ij}. Furthermore, it is assumed that $\omega \ll \omega_{Hi}$, $kv_0 \ll \omega_{Hi}$ where ω_{Hi} is the gyrofrequency of the ions, $v_i = (T_i/M)^{1/2}$ the mean thermal velocity of the ions (T_i denotes the temperature and M the mass of the ions) and v_0 the velocity of the beam. Under these conditions (1) falls into the equations $(kc/\omega)^2\cos^2\theta - \varepsilon_{11} = 0$ (3) and $(kc/\omega)^2 - \varepsilon_{22} - \varepsilon_{23}^2/\varepsilon_{33} = 0$ (4) describing the Alfvèn wave and the sound wave, respectively. If the velocity distribution of the particles in the beam has the form

$$f_{e,i} = n_0'\left(\frac{m_{e,i}}{2\pi T'_{e,i}}\right)^{3/2}\exp\left(-\frac{m_{e,i}(v-v_0)^2}{2T'_{e,i}}\right) \quad (5)$$

(n_0' density of the particles in the beam, T_e', T_i' temperatures of the electrons and ions of the beam, $m_e = m$, $m_i = M$)

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$$\varepsilon_{11} = 1 + \sum_a \frac{\Omega_a^2 (\omega - k_\parallel v_{0a})^2}{\omega_{Ha}^2 \omega^2}, \quad \varepsilon_{22} = \varepsilon_{11} + \sum_a \frac{\Omega_a^2 k^2 v_a^2}{\omega_{Ha}^2 \omega^2} 2i\sqrt{\pi}\sin^2\theta z_a w(z_a),$$

$$\varepsilon_{33} = 1 + \sum_a \frac{\Omega_a^2}{k_\parallel^2 v_a^2}(1 + i\sqrt{\pi} z_a w(z_a)),$$

$$\varepsilon_{23} = -\sum_a \frac{\Omega_a^2}{\omega\omega_{Ha}} \sqrt{\pi}\,\mathrm{tg}\,\theta z_a w(z_a), \qquad (6)$$

где

$$w(z_a) = e^{-z_a^2}\left(\pm 1 + \frac{2i}{\sqrt{\pi}} \int_0^{z_a} e^{t^2} dt\right), \quad z_a = \frac{\omega - k_\parallel v_{0a}}{\sqrt{2} k_\parallel v_a},$$

$$\Omega_a^2 = 4\pi e^2 n_{0a}/m_a, \quad v_a^2 = T_a/m_a, \quad \omega_{Ha} = e_a H_0/m_a c, \quad k_\parallel = k\cos\theta$$

holds with Maxwellian equilibrium velocity distribution of the electrons and ions of the plasma. The upper and lower signs in $\omega(z_\alpha)$ hold with $k_\parallel > 0$ and $k_\parallel < 0$, respectively; the index α denotes the types of all particles of the plasma and the beam. With the aid of (6) expression

$$\omega = k_\parallel \frac{v_0\Omega_i'^2 \pm [(\Omega_i^2 + \Omega_i'^2) c^2\omega_{Hi}^2 - \Omega_i^2\Omega_i'^2 v_0^2]^{1/2}}{\Omega_i^2 + \Omega_i'^2}, \qquad (7)$$

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for the frequency of the Alfvèn wave modified by the existence of the beam is obtained from (3). Due to the excitation of the Alfvèn waves the state of the system plasma - beam is unstable if condition

$$v_0^2 > V_A'^2 + V_T^2, \quad (8)$$

где $V_A = H_0/\sqrt{4\pi n_0 M}$, $V_A' = H_0/\sqrt{4\pi n_0' M}$,

is fulfilled. With sufficiently low densities of the beam the excitation of the Alfvèn waves is impossible as long as the coupling between the Alfvèn waves and the magneto-acoustic waves is neglected. When considering this coupling an instability is observed also with those densities at which (8) is not valid. In the following study of the beam by means of the magneto-acoustic waves the density of the beam is assumed to be small as compared to the plasma density. With $kv_i \ll \omega \ll kv_e$ the solution of the dispersion equation (4) has the form

$$\omega_\pm = kV_\pm, \quad V_\pm^2 = \frac{1}{2}\left(V_A^2 + s^2 \pm \left[(V_A^2 + s^2)^2 - 4V_A^2 s^2 \cos^2\theta\right]^{1/2}\right), \quad (9)$$

with lacking beam, where $s = (T_e/M)^{1/2}$. With $V_A \sim s$ the quantities $V_\pm$ are also of the order of magnitude s. In this case the condition $\omega \gg kv_i$

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holds only for a strongly nonisothermal plasma ($T_e \gg T_i$) while the magneto-acoustic waves with $T_e \lesssim T_i$ are strongly attenuated. Besides, also $|\omega - k_{\parallel} v_0| \gg k v_e'$ holds. The dispersion equation (4) then reads as follows: $\omega = k_{\parallel} v_0 + \varepsilon$ (10) with $|\varepsilon| \ll |k_{\parallel} v_0|$. Under the conditions studied, the state of the system plasma-beam is unstable due to the excitation of the magneto-acoustic waves. If v_0 does not lie in the interval $s < v_0 < V_A$ this instability occurs even with neglection of η ($|\eta| \ll 1$). With $v_0 \cos\theta \to V_{\pm}$, (13) holds. With the maximum (resonance) interaction (with $V_{\pm} = v_0 \cos\theta$) the increment of increase of the oscillations is not proportional to $(n_0'/n_0)^{1/2}$ but to $(n_0'/n_0)^{1/3}$. The solutions (10) to (13) of the dispersion equation (4) hold for a strongly non-isothermal plasma. With $T_e \lesssim T_i$,

$$\varepsilon = \left(\frac{M}{m}\right)^{1/3} \varepsilon_0 = \pm \frac{\Omega_i^2 (n^2 - \varepsilon_{22}^{(0)})^{1/3}}{[\varepsilon_{33}^{(0)} (n^2 - \varepsilon_{22}^{(0)}) - \varepsilon_{23}^{(0)2}]^{1/3}}, \qquad (14)$$

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25206
S/056/61/040/006/027/031
B125/B202

Interaction between charged ...

is obtained with neglection of the thermal motion of the electrons of the beam. ε^{o}_{ij} is the component of the tensor of the dielectric constant of the plasma without beam with $\omega = k_{\parallel}v_{o}$. An instability also occurs with $T_e \lesssim T_i$ if the plasma oscillations are weakly attenuated. With $kv_i' \ll |\omega - k_{\parallel}v_o| \ll kv_e'$ the thermal motion of the electrons in the beam has to be taken into account. (4) then has the solution $\omega = k_{\parallel}v_o + \varepsilon_o$, $|\varepsilon_o| \ll k_{\parallel}v_o|$ (15) where ε_o is obtained from (14). If $k_{\parallel}v_o$ lies near the eigenfrequency $kV_{\pm}$ of the magneto-acoustic wave in the nonisothermal plasma $\omega = kV_{\pm} + \varepsilon_o$, $|k(v_o\cos\theta - V_{\pm})| \ll |\varepsilon_o|$ (16) holds where ε_o is to be determined from (13). These formulas hold for sufficiently low temperatures of the beam $|\omega - k_{\parallel}v_o| \gg kv_i'$. With sufficiently small n_o'/n, $\omega = \omega_{\pm} + i\gamma_{\pm}$ holds with

$$\gamma_{\pm} = -\frac{\sqrt{\pi}\,\omega_{\pm}\sin^2\theta\,(\xi_e + \xi_e' + \xi_i')}{4\zeta_{\pm}\,|\cos^2\theta - \zeta_{\pm}|\,(\zeta_{+} - \zeta_{-})}, \qquad \zeta_{\pm} = \left(\frac{V_{\pm}}{s}\right)^2.$$

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25206
S/056/61/040/006/027/031
B125/B202

Interaction between charged ...

A beam with low density and high energy spread of the electrons and ions generally does not cause a magneto-acoustic wave in the plasma. There are 9 references: 7 Soviet-bloc and 2 non-Soviet-bloc. The two most recent references to English-language publications read as follows: D. Bohm, E. Gross. Phys.Rev.,75, 1851, 1864, 1949. I.B. Bernstein, R.M. Kulsrud. Phys.Fl., 3, 937, 1960.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Institute of Physics and Technology of the Academy of Sciences of the Ukrainskaya SSR)

SUBMITTED: January 27, 1961

Card 7/7

35359
S/057/62/032/003/006/019
B116/B102

24.6716

AUTHORS: Kitsenko, A. B., and Stepanov, K. N.

TITLE: Excitation of magnetosonic waves in dilute plasma by a charged particle flow

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 3, 1962, 303 - 307

TEXT: The excitation of "fast" and "slow" magnetosonic waves in dilute plasma by a charged particle flow of arbitrary density was studied. The following assumptions were made: The Alfvèn velocity is much greater than the sonic velocity, plasma and particle flow are dilute so that "near" collisions may be neglected, space charge and electric current of the particle flow are compensated in the state of equilibrium. The dispersion equation for magnetosonic waves

$\frac{k^2c^2}{\omega^2} - \varepsilon_{22} - \frac{\varepsilon_{23}^2}{\varepsilon_{33}} = 0$ (1) is written down, where ε_{ij} is the tensor of the dielectric constant (axis 3 runs parallel to the external magnetic field $\vec{H}_0$, the wave vector $\vec{k}$ is in the 1-3 plane). (1) holds if $\omega \ll \omega_{Hi}$,

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Excitation of magnetosonic...

$kv_i \ll \omega_{Hi}$, $kv_0 \ll \omega_{Hi}$, where ω_{Hi} and v_i = hydrogen frequency and mean thermal velocity of ions respectively, v_0 = beam velocity ($\vec{v}_0 \parallel \vec{H}_0$). If beam and plasma particles show Maxwellian velocity distribution, the components of ε_{ij} are:

$$\left.\begin{aligned}
\varepsilon_{11} &= 1 + \sum_\alpha \frac{\Omega_\alpha^2 (\omega - k_\parallel v_0)^2}{\omega_{H\alpha}^2 \omega^2}, \\
\varepsilon_{22} &= \varepsilon_{11} + \sum_\alpha \frac{\Omega_\alpha^2 k^2 v_\alpha^2}{\omega_{H\alpha}^2 \omega^2} 2i\sqrt{\pi} \sin^2\theta \, z_\alpha w(z_\alpha), \\
\varepsilon_{33} &= 1 + \sum_\alpha \frac{\Omega_\alpha^2}{k_\parallel^2 v_\alpha^2} (1 + i\sqrt{\pi}\, z_\alpha w(z_\alpha)), \\
\varepsilon_{23} &= -\sum_\alpha \frac{\Omega_\alpha^2}{\omega_{H\alpha}\omega} \operatorname{tg}\theta \sqrt{\pi}\, z_\alpha w(z_\alpha),
\end{aligned}\right\} \quad (2)$$

$$w(z_\alpha) = e^{-z_\alpha^2}\left(\pm 1 + \frac{2i}{\sqrt{\pi}} \int_0^{z_\alpha} e^{t^2} dt\right), \quad z_\alpha = \frac{\omega - k_\parallel v_0}{\sqrt{2}\, k_\parallel v_\alpha},$$

$$\Omega_\alpha^2 = \frac{4\pi e^2 n_{0\alpha}}{m_\alpha}, \quad v_\alpha^2 = \frac{T_\alpha}{m_\alpha}, \quad \omega_{H\alpha} = \frac{e_\alpha H_0}{m_\alpha c}, \quad k_\parallel = k\cos\theta,$$

X

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θ is the angle between $\vec{k}$ and $\vec{H}_0$. First, the oscillations corresponding to the "fast" magnetosonic wave are investigated. It is assumed that $\frac{\omega}{k} \gg v_i,\ v_i',\ v_0\sqrt{m/M},\ v_e'\sqrt{m/M}$, the indices e and i denote electrons and ions respectively, the primes refer to beam particles. The solution of (1) is $\omega = \omega_{\pm}$, where

$$\omega_{\pm} = k\frac{n_0' v_0 \cos\theta \pm \sqrt{n_0' n_0 (V_A^2 + V_A'^2 - v_0^2 \cos^2\theta)}}{n_0' + n_0}, \qquad (3)$$

$$V_A = \frac{H_0}{\sqrt{4\pi n_0 M}}, \quad V_A' = \frac{H_0}{\sqrt{4\pi n_0' M}}.$$

From (3) follows the instability condition $v_0^2 > V_A^2 + V_A'^2$. Consideration of the kinetic effects shows that instability may also occur at $v_0^2 < V_A^2 + V_A'^2$. In this case, $\omega = \omega_{\pm} + i\gamma_{\pm}$, $|\gamma_{\pm}| \ll |\omega_{\pm}|$. On the above assumptions, the dispersion equation for "slow" magnetosonic waves reads $\varepsilon_{33}(\omega, \vec{k}) = 0$ (6). For the case $|\omega - k_{\parallel} v_0| \gg kv_e'$, (6) gives

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$$\frac{\Omega_i^2}{\omega^2} + \frac{\Omega_i'^2}{(\omega - k_\parallel v_0)^2} = \frac{\Omega_i^2}{k_\parallel^2 s^2}(1 + i\sqrt{\pi} z_e), \qquad (7)$$

where $s = T_e/M$ is the sonic velocity, $z_e = \frac{\omega}{\sqrt{2}\,|k_\parallel|\, v_e}$ $(|z_e| \ll 1)$. If $z_e = 0$, the instability condition

$$v_0^2 < \frac{s^2}{n_0}\left[n_0^{1/3} + \left(n_0' \frac{M}{m}\right)^{1/3}\right]^3. \qquad (8)$$

is obtained. Explicit formulae for the increments γ can be obtained from (7) for some limiting cases only. For the case $kv_i' \ll |\omega - k_\parallel v_0| \ll kv_e'$, (6) gives

$$\frac{\Omega_i^2}{\omega^2} + \frac{\Omega_i'^2}{(\omega - k_\parallel v_0)^2} = \frac{\Omega_i^2}{k_\parallel^2 s^2}(1 + i\sqrt{\pi} z_i) + \frac{\Omega_i'^2}{k_\parallel^2 s'^2}(1 + i\sqrt{\pi} z_i'). \qquad (12)$$

Neglecting z_i and z_i', the instability condition

$$v_0^2 < \frac{s^2 s'^2 (n_0^{1/3} + n_0'^{1/3})^3}{n_0 s'^2 + n_0 s^2} \qquad (13).$$

X

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is obtained. The solution of (12) can be found explicitly in some special cases. For $|\omega - k_{\parallel} v_0| \ll k v_i^{\prime}$, (7) gives $\omega = k_{\parallel} u + i\gamma$, where

$$\frac{1}{u^2} = \frac{1}{s^2} + \frac{n_0'}{n_0}\left(\frac{1}{s^2} + \frac{1}{v_i^2}\right),$$

$$\gamma = -\sqrt{\frac{\pi}{8}}\,\omega_0 u^3 \left\{\sqrt{\frac{m}{M}}\frac{u}{s^3} + (u - v_0)\frac{n_0'}{n_0}\left(\sqrt{\frac{m}{M}}\frac{1}{s^3} + \frac{1}{v_i^3}\right)\right\}. \quad (18)$$

Then the instability condition is
$$v_0 - u > \frac{n_0 u s^3 v_i^3}{n_0' \left(\sqrt{\frac{M}{m}} s^3 + v_i^3\right)}. \quad (19)$$

A. I. Akhiyezer is thanked for advice. There are 7 references: 6 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: I. B. Bernstein, R. M. Kulsrud. Phys. Fl., 3, 937, 1960.

SUBMITTED: January 31, 1961 (initially)
May 3, 1961 (after revision)

X

KITSENKO, A.B.

Interaction of charges with an electron plasma in a magnetic field. (MIRA 15:7)
Dokl.AN SSSR 145 no.2:305-308 Jl '62.

1. Fiziko-tekhnicheskiy institut AN USSR. Predstavleno akademikom M.A.Leontovichem.
(Plasma (Ionized gases)) (Magnetic fields)

ACCESSION NR: AT4036038 S/2781/63/000/003/0003/0017

AUTHORS: Kitsenko, A. B.; Stepanov, K. N.

TITLE: Investigation of plasma oscillations in the quasihydrodynamic approximation

SOURCE: Konferentsiya po fizike plazmy* i problemam upravlyayemogo termoyadernogo sinteza. 3d, Kharkov, 1962. Fizika plazmy* i problemy* upravlyayemogo termoyadernogo sinteza (Plasma physics and problems of controlled thermonuclear synthesis); doklady* konferentsii, no. 3. Kiev, Izd-vo AN UkrSSR, 1963, 3-17

TOPIC TAGS: plasma oscillation, magnetohydrodynamics, ionized plasma, plasma ion oscillation, plasma wave reflection, terrestrial magnetism, solar corpuscular radiation, ionosphere

ABSTRACT: The longitudinal oscillations of a plasma with nonisotropic distribution function, and the excitation of magnetohydrody-

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ACCESSION NR: AT4036038

namic waves in interpenetrating plasma streams with nonisotropic
particle velocity distribution functions, are considered on the
basis of the quasihydrodynamic equations. It is confirmed on the
basis of these equations that one-dimensional Langmuir oscillations
of an electron gas can be regarded as adiabatic with an adiabatic
exponent $\gamma = 3$. The effects of the ions on both high-frequency
and low-frequency oscillations are considered. It is shown that
anomalous dispersion occurs in both frequencies. In a plasma con-
sisting of two species of ions, plasma resonance in the region of
both high and low frequencies has the same distinguishing features,
namely the limitation of the growth of the refractive index because
of the presence of thermal motion of the plasma particles, and the
appearance of a new branch of oscillations (plasma waves) with
anomalous dispersion properties. An experimental investigation of
the propagation of radio waves through a plasma at resonance makes
it possible to determine several important characteristics of the
plasma. The excitation of magnetohydrodynamic waves when streams

ACCESSION NR: AT4036038

of charged particles pass through a plasma is of particular interest in connection with the interaction between solar corpuscular streams in the upper ionosphere, for the plasma instability arising in the case of such a stream can lead to variations of the earth's magnetic field and to the appearance of ultralow frequency radiation. "In conclusion the authors are deeply grateful to A. I. Akhiyezer for interest in the work." Orig. art. has: 32 formulas.

ASSOCIATION: None

SUBMITTED: 00 DATE ACQ: 21May64 ENCL: 00

SUB CODE: ME, AA NR REF SOV: 016 OTHER: 004

Card 3/3

ANGELEYKO, V.V. [Anheleiko, V.V.], KITSENKO, A.B. [Kitsenko, O.B.]

Excitation of sound waves in a weakly ionized plasma. Ukr. fiz. zhur. 10 no.1:16-20 Ja '65. (MIRA 18:4)

1. Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov.

L 40942-65 EPF(c)/EWT(1)/EEC(t) Pi-4 IJP(c) GG/WW

ACCESSION NR: AP5007292 S/0057/65/035/003/0470/0474

72
30
B

AUTHOR: Angeleyko, V.V.; Kitsenko, A.B.

TITLE: On the cyclotron excitation of magneto-acoustic waves by a stream of charged particles

SOURCE: Zhurnal tekhnicheskoy fiziki, v.35, no.3, 1965, 470-474

TOPIC TAGS: plasma beam interaction, plasma stability, magnetic sound wave, cyclotron resonance

21

ABSTRACT: The authors discuss the interaction of a neutral stream of charged particles with the low frequency oscillations (fast and slow magneto-acoustic waves) of a highly anisothermal plasma in an external magnetic field. The magnetic and kinetic pressures are assumed to be of the same order of magnitude, and the interaction is discussed in the neighborhood of the cyclotron resonance under conditions of the anomalous Doppler effect. The relevant dispersion equation is quoted from earlier work (K.N.Stepanov and A.B.Kitsenko, ZhTF 31,167,1961) and is simplified for the case in which the frequency is low compared with the ion Larmor frequency and the phase velocity is high compared with the ion thermal velocity and low com-

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ACCESSION NR: AP5007292

pared with the electron thermal velocity. Solutions are obtained and discussed separately for the case of a hot beam and that of a cold beam, and for conditions of cyclotron resonance with the ions, and with the electrons of the beam. "In conclusion, the authors express their deep gratitude to A. I. Akhiyezer and K. N. Stepanov for valuable advice and discussions of the work." Orig. art. has: 20 formulas

ASSOCIATION: none

SUBMITTED: 04Jun64 ENCL: 00 SUB CODE: ME

NR REF SOV: 007 OTHER: 001

Card 2/2

ANGELEYKO, V.V.; KITSENKO, A.B.

Cyclotron excitation of magnetoacoustic waves by a charged particle flux. Zhur. tekh. fiz. 35 no.3:470-474 Mr '65. (MIRA 18:6)

L 08805-67 EWT(1) IJP(c) AT/GD (N) SOURCE CODE: UR/0000/65/000/000/0131/0136
ACC NR: AT6020443

AUTHOR: Kitsenko, A. B.; Gapontsev, B. A.

51

ORG: none

TITLE: Movement of streams of charged particles through a plasma at an arbitrary angle relative to the internal magnetic field

SOURCE: AN UkrSSR. Vzaimodeystviye puchkov zaryazhennykh chastits s plazmoy (Interaction of charged particle beams with plasma). Kiev, Naukova dumka, 1965, 131-136

TOPIC TAGS: plasma magnetic field, charged particle, electron oscillation

ABSTRACT: The excitation of high frequency electron oscillations by a relativistic beam of charged particles moving in an arbitrary direction relative to the internal magnetic field is studied. The main interaction effect is assumed to take place where the wave frequency exceeds the cyclotron frequency of the beam and the wavelength is small compared with the cyclotron radius. The analysis of the tensor giving the dielectric properties of such interacting system gives the rate of growth of ordinary and extraordinary waves. The simplifying assumption which considers only waves with phase velocity much smaller than that of light yields a simple expression for the growth coefficients. In addition, so-called "whistler waves" are considered as a special case, where it is shown that small phase velocity waves are most effectively

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L 08805-67

ACC NR: AT6020443

generated when the angle between the wave vector and magnetic field direction approaches 90°. The case of nonrelativistic streams and their rate of growth obtained for the "whistler" mode case is also discussed. Orig. art. has: 4 figures.

SUB CODE: 20/ SUBM DATE: 11Nov65/ ORIG REF: 003

Card 2/2 nst

L 08804-67 EWT(1) IJP(c) AT/GD (N) SOURCE CODE: UR/0000/65/000/000/0136/0143

ACC NR: AT6020444

AUTHOR: Angeleyko, V. V.; Kitsenko, A. B. 71

ORG: none

TITLE: Excitation of longitudinal oscillations in a magnetoactive plasma

SOURCE: AN UkrSSR. Vzaimodeystviye puchkov zaryazhennykh chastits s plazmoy (Interaction of charged particle beams with plasma). Kiev, Naukova dumka, 1965, 136-143

TOPIC TAGS: magnetoactive plasma, Cerenkov radiation, Doppler effect, plasma oscillation, plasma instability

ABSTRACT: This work investigates the excitation of longitudinal oscillations in a plasma consisting of two types of ions through which a stream of particles is moving under an arbitrary angle to the direction of the internal magnetic field. The dispersion relation for the plasma is analyzed and the relationship between its four roots is studied. In the presence of the stream, a new dispersion relation is written consisting of that for the plasma and the added term for the beam and for the interaction effects. This relationship is studied for the case of a cold stream under the conditions of Cerenkov resonance and for the case of a cold stream under conditions of anomalous Doppler effect. In addition, "hot" beam interaction with the plasma is briefly discussed. The instability criteria and growth rates for the various waves is given under speci-

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L 08804-67

ACC NR: AT6020444

fied relationships between the frequencies characterising the plasma and beam systems. Orig. art. has: 23 formulas.

SUB CODE: 20/ SUBM DATE: 11Nov65/ ORIG REF: 005/ OTH REF: 002

Card 2/2 nst

KITSENKO, A.V., veterinarnyy vrach

Epizootiology of anaplasmosis in cattle. Veterinariia 41 no.11:44-45 N '64. (MIRA 18:11)

1. Khorezmskaya oblastnaya veterinarnaya laboratoriya.

KITSENKO, L.

RUDITSYN, Mikhail Nikolayevich; KITSENKO, L., red.; GELEN'KAYA, I., tekhn.red.

[Computation and graphic work on strength of materials] Raschetno-graficheskie raboty po soprotivleniiu materialov. Minsk, Izd-vo Belorusskogo gos.univ. im. V.I.Lenina, 195?. 227 p. (MIRA 11:7)
(Strength of materials)

ANDERS, Aleksandr Aleksandrovich; KITSENKO, M.P., insh., retsenzent;
SMIRNOV, B.V., insh., red.; NAKHIMSON, V.A., red.izd-va;
SOKOLOVA, T.F., tekhn.red.

[Technology of machining] Tekhnologiia mekhanicheskoi obrabotki;
sbornik zadach. Izd.2., perer. i dop. Moskva, Gos. nauchno-tekhn.
izd-vo mashinostroit. lit-ry, 1958. 352 p. (MIRA 12:2)
(Machine-shop practice)

L 31049-65 EWT(1)/EPA(sp)-2/T/EEC(t)/EPA(w)-2/EWA(m)-2 Pz-6/Po-4/Pab-10/Pi-4
IJP(c) AT

ACCESSION NR: AP5004319 S/0185/65/010/001/0016/0020 56 58 B

AUTHOR: Anhelyko, V. V. (Angelyko, V.V.); Kitsenko, O. B. (Kitsenko, A. B.)

L 31049-65

ACCESSION NR: AP5004319

4

authors thank A. I. Akhiyezer for suggesting the topic and for interest in the work, and also K. N. Stepanov and I. A. Akhiyezer for valuable advice." Orig. art. has: 12 formulas.

ASSOCIATION: Fiziko-tekhnichnyy instytut AN UkrSSR, Khar'kov (Physicotechnical Institute AN UkrSSR)

SUBMITTED: 02Apr64 ENCL: 00 SUB CODE: ME

NR REF SOV: 005 OTHER: 001

Card 2/2

KITSENKO, V.

In step with life. Fin. SSSR 21 no.3:61-66 Mr '60. (MIRA 13:3)

1. Starshiy inspektor Ministerstva finansov Moldavskoy SSR.
(Kishinev--Finance)

KITSENKO, V.P.

Morbidity among workers in the petroleum industry and methods for decreasing it. Sov. zdrav. 13 no.4:21-24 Jl-Ag '54. (MLRA 7:9)

1. Iz kafedry nervnykh bolezney Kubanskogo meditsinskogo instituta (zav. prof. V.Ya. Anfimov)
(OCCUPATIONAL DISEASES, statistics,
Russia, in petroleum workers)

KITSENKO, V.P. (Krasnodar)

Method for treating ischias at medical centers. Kaz.-med.zhur. 40 no.2:82 Mr-Ap '59. (MIRA 12:11)
(HIP JOINT--DISEASES)

KITSENKO, V.P.

Intramuscular use of novocaine under polyclinic conditions. (MIRA 13:7)
Vrach.delo no.7:131 Jl '60.

1. Glavnyy vrach polikliniki No.2 (Krasnodar).
(NOVOCAINE)

KITSENKO, V.P.

Organisation of anticoagulant therapy for cardiovascular patients under polyclinical conditions. Kaz.med.zhur. no.5:83-84 S-O '62. (MIRA 16:4)

1. Vtoraya neob"yedinennaya poliklinika Krasnodara (glavnyy vrach - V.P.Kitsenko).
(ANTICOAGULANTS (MEDICINE))
(CARDIOVASCULAR PATIENT—CARE AND TREATMENT)

KITSENKO, V.P.; NESTEROV, V.A.

Study of industrial traumatism at the Sedin Machine-Tool Plant. Nauch. trudy Kub. gos. med. inst. 19:56-62 '62. (MIRA 17:8)

1. Iz kafedry organizatsii zdravookhraneniya Kubanskogo gosudarstvennogo meditsinskogo instituta (zaveduyushchiy - dotsent V.A. Nesterov) i 2-y polikliniki g. Krasnodara (glavnyy vrach V.P. Kitsenko).

KITSENKO, V.P.

Incidence of neurological diseases in Krasnodar. Nauch. trudy Kub. gos. med. inst. 19:152-159 '62. (MIRA 17:8)

1. Iz kafedry organizatsii zdravookhraneniya (zaveduyushchiy - dotsent V.A. Nesterov) i kafedry nervnykh bolezney (zaveduyushchiy - prof. M.I. Kholodenko) Kubanskogo gosudarstvennogo meditsinskogo instituta.

KITSENKO, V.P.

Quality of examination and treatment of patients suffering from neurological diseases in a polyclinic. Zdrav.Ros.Feder. 7 no.3: 21-22 Mr '63. (MIRA 16:3)
(KRASNODAR—NEUROLOGY) (KRASNODAR—CLINICS)

KITSENKO, V.P.

Some problems of organising the work of a neuropathologist in a polyclinic. Zdrav. Ros. Feder. 7 no.9:20-22 S '63.
(MIRA 16:10)

1. Iz 2-y neob"yedinennoy polikliniki Krasnodara (glavnyy vrach V.P. Kitsenko).

GONCHAROV, S.P.; KITSENKO, V.V.; MARGULIS, A.I.; CHERNYAVSKIY, L.G.; RZHAVSKIY, [redacted] tekhnicheskikh nauk, redaktor; MARKUS, M. Ye., inzhener, redaktor; MATVEYEVA, Ye.N., tekhnicheskiy redaktor; SOKOLOVA, T.F., tekhnicheskiy redaktor.

[Measurements of strains and stresses; handbook] Izmerenie napriazhenii i usilii; spravochnoe posobie. Moskva, Gos. nauchno-tekhn.izd-vo mashinostroit. lit-ry, 1955. 66 p. (MLRA 8:9)
(Strains and stresses)

KONOPLEV, Yu.V.; KITSENKO, Yu.A.; KALICHENKO, B.V.

Using the pulse neutron-neutron logging method in studying the possibility of determining the water-oil contact in horizon 4 of the Anastasiyevka-Troitskoye oil field. Geol. nefti i gaza 9 no.4:44-48 Ap '65. (MIRA 18:8)

1. Krasnodarskiy filial Vsesoyuznogo nauchno-issledovatel'skogo instituta geofizicheskikh metodov razvedki i Neftepromyslovoye upravleniye Priazovneft'.

L 33265-66 EWT(m)

ACC NR: AT6012791 (N) SOURCE CODE: UR/3175/66/000/027/0141/0145

AUTHOR: Kitsenko, Yu. A.; Konoplev, Yu.V. 39 B+1

ORG: Krasnodar Division, VNIIGeofizika (Krasnodarskiy filial VNIIGeofiziki)

TITLE: Introduction of the oil well impulse neutron generator IGN-1

SOURCE: USSR, Gosudarstvennyy geologicheskiy komitet. Osoboye konstruktorskoye byuro. Geofizicheskaya apparatura, no. 27, 1966, 141-145

TOPIC TAGS: petroleum engineering, neutron, petroleum industry equipment, temperature instrument/ IGN-1 petroleum industry equipment

ABSTRACT: This paper describes modifications of the oil well neutron impulse generator IGN-1, done locally to improve field operations under higher temperatures. To decrease heat generation, permanent magnets were substituted for the electromagnet of the ion source of the accelerating tube; oil volume was decreased by redesign, to utilize the available expansion sylphone at higher temperatures; teflon insulated wires installed etc. To improve the registration effectiveness, the thermal neutron counter SNM-20 was replaced by SNM-20a, which required a higher voltage supply. Delay times, channel sensitivities and integration times were modified to increase measurement effectiveness. Tests showed stable operation in oil wells at 70°C. (Design of the IGN-1 apparatus in its entirety is not described, Abstractor). Orig. art. has 4 figures.

SUB CODE: 13, 11 / SUB DATE: None/ ORIG REF: 000

Card 1/1

VOLOVIK, T.N. [Volovyk, T.M.]; KITSERA, L.Ye. [Kitsera, L.O.]

Some changes in memory block No.5 of the magnetic drum in the electronic computer "Ural-1". Visnyk L'viv. un. Ser. mekh.-mat. no.1:54-56 '65.

(MIRA 18:12)

KITSIS, A., insh.; YUZBASHEV, S., ekonomist

Precast reinforced concrete roof panels. Stroi. mat. 4 no. 6:31 Je '58. (MIRA 11:7)

(Roofing, Concrete)

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000722920011-7"

KITSIS, G.N.

Outpatient card is the medical passport of a sick person. Fel'd. i akush. 28 no.5:50-51 My '60. (MIRA 16:7)

1. Iz Orgeyevskoy rayonnoy bol'nitsy, Moldavskaya SSR. (MEDICAL RECORDS)

KITSIS, O.N.

Medical documentation at feldsher and obstetric stations. Zdravookhranenie 4 no.6:42-44 N-D '61. (MIRA 15:2)

1. Iz rayonnoy bol'nitsy g. Orgeyeva (glavnyy vrach Ye.M.Golovina).
(MEDICAL RECORDS)

ROZET, G.I., dotsent; ALKHAN-KEMAL, G., vrach-metodist; KITSIS, G.N.; KRYLOV, P.M.

Letters to the editor. Zdrav.Ros.Feder. 6 no.11:35-37 N '62. (MIRA 15:12)

1. Zaveduyushchiy kabinetom ucheta i meditsinskoy statistiki Orgeyevskoy rayonnoy bol'nitsy Moldavskoy SSR (for Kitsis).
(PUBLIC HEALTH) (VISHNEVSKII, PETR STEPANOVICH)

GOLOVINA, Ye. M.; KITSIS, G.N.

Methodological center at a district hospital. Zdravookhraneniye 6 no.5:8-9 S-O'63 (MIRA 16:12)

1. Iz orgeyevskoy rayonnoy bol'nitsy (glavnyy vrach Ye.M. Golovina).

KITSIS, O.N. (g. Orgeyev)

Planning a network of public health institutions in a district. Sovet. zdravookhr. 5:45-47 '63 (MIRA 17:2)

1. Is Orgeyevskoy rayonnoy bol'nitsy Moldavskoy SSR (glavnyy vrach Ye.M.Golovina).

KOZLOV, Sidor Fedorovich; PAVLYUKEVICH, Aleksandr Ivanovich; KITSIS, M.S., red.; GRIGOR'YEVA, I.S., red. izd-va; BELOGUROVA, I.A., tekhn.red.

[Hard-alloy cutting tools for the machining of light alloys] Tverdosplavnye reshushchie instrumenty dlia obrabotki legkikh splavov. Leningrad, 1962. 22 p. (Leningradskii dom nauchno-tekhnicheskoi propagandy. Obmen peredovym opytom. Seriia: Mekhanicheskaia obrabotka metallov, no.25) (MIRA 16:2)
(Metal-cutting tools)

VERIGIN, N.N., prof.; Primimali Uchastiye: KITSIS, R.A., inzh.; ZHIGALIN, B.I., inzh.; AFINOGENOVA, M.V., inzh.; VINOGRADOVA, G.M., red. izd-va; KASIMOV, D.Ya., tekhn. red.

[Methods of determining the filtration properties of rocks] Metody opredeleniia fil'tratsionnykh svoistv gornykh porod. Moskva, Gos. izd-vo lit-ry po stroit., arkhit. i stroit. materialam, 1962. 177 p. (MIRA 15:4)

1. Moscow. Vsesoyuznyy nauchno-issledovatel'skiy institut vodosnabzheniya, kanalizatsii, gidrotekhnicheskikh sooruzheniy i inzhenernoy gidrogeologii.

(Rocks--Permeability)

KITSIS, S., inzhener-elektromekhanik

Electric noncontact differential device. Mor.flot 25 no.6:15 Jl '65. (MIRA 19:1)

KITSIS, S.B.; BURGANSKIY, L.I.

Treatment of clays at the Krichev cement plant. TSement 24 no.1:24-26 Ja-Fe '58. (MIRA 11:4)

1.Krichevskiy tsementnyy zavod.
(Krichev--Cement) (Clay)

ALESHINA, O.K., inzh.; KITSIS, S.B., inzh.; SHAKHMAGON, N.V., inzh.; ENTIN, Z.B., inzh.

Using sodium fluosilicate as a mineralizer at the Krichev Cement Factory. Nauch. soob. NIITSementa no. 7:1-4 '60. (MIRA 14:5)
(Sodium fluosilicates) (Cement clinkers)

KITSIS, S.I., inzh.

Automation of hoisting machinery. Mekh.i avtom.proizv. 17 no.7:30-32 Jl '63. (MIRA 16:8)

(Hoisting machinery) (Automatic control)

KITSIS, S.I., inzh.

[redacted]

Preverting overloading of electric motors in repetitive short-term mode of operation. Elektrotekhnika 35 no.1:63 Ja '64. (MIRA 17:2)

KIISIS, I.I., inzh.

Electric noncontact control device for grab winches. Mekh. i avtom. proizv. 18 no.6:32-34 Je '64. (MIRA 17:9)

KITSIS, S.I., inzh.

Thermal protection in the electric motors of crane mechanisms. Prom. energ. 18 no.8:20-21 Ag '63. (MIRA 16:9)
(Electric cranes)

KITSIS, S.I., inzh.

Heat insulation of the electric drives of crane mechanisms. Mech. transp. 22 no.3:13-14 Mr '63. (MIRA 16:4)
(Electric cranes) (Insulation (Heat))

KITSIS, S.I., inzh.

Self-start network for low-voltage electric motors. Prom. energ. 17 no.12:47-48 D '62. (MIRA 17:4)

KITSIS, S.I., inzh.

Use of cosine condensers for braking asynchronous motors.
Prom. energ. 17 no.6:23-25 Je '62. (MIRA 17:6)

KITSKIY, B.

USSR/Gasoline May 1947
Engines, Gasoline

"Concerning the Quality of Gasoline for Use in New Model Cars," B. Kitskiy, Engr, 2 pp

"Avtomobil'" Vol XXV, No 5

Table giving important data on motors in new model cars. Recommended winter, summer and special gasolines for new models, economy of fuel by raising the compression ratio of the engines.

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F

2432. SPECIFICATIONS FOR AUTOMOTIVE GASOLINES. Kitakii, S.P. (Avto. Prom., 1948, (4), 2-4; abstr. in Chem. Abstr., 1949, vol. 43, 4838). Minimum requirements are: octane number not below 70, content of ethyl fluid P-9 in m.l. per k.g., not over 1.0-1.5, vapour pressure 375-400 m.m., content of resins in 100 cu. m.m. not over 3-6 m.g., S content not over 0.07-0.10%, induction period 600 min., fractional composition: 10% b.p. is 72-78°, 50% b.p. is 130-145°, 90% b.p. is 185-190°, end of distillation 200°.

C.A.

METALLURGICAL LITERATURE CLASSIFICATION

VOINOV, N. P.; KONEV, B. P.; KITSKIY, B. P.

KITSKIY, B. P.

Toplivo i Smazka Otechestvennykh Legkovtkh Avtomobilei (Fuel and Oil for Fatherland Light Automobiles), State Scientific-Technical Publ. House of Petroleum and Ground-fuel Lit., Moscow-Leningrad, 1951.

KITSKIY, B. P.

Toplivo i smazka otechestvennykh bol'shegruznykh avtomobiley (Fueling and lubrication of Russian heavy trucks, by) B. P. Kitskiy (and) N. S. Khanin, Moskva, Gostoptekhizdat, 1952.
172 p. illus., diagrs., tables
"Literatura": p. (174)

SO: N/5
793.221
.K6

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000722920011-7"

KITSKIY, B. P.

Kitskiy, B. P.

"The effect of the temperature of the walls of the combustion chamber on certain parameters of the operating cycle of a two-stroke high-speed engine with straight exhaust flow." Min Higher Education USSR. Moscow Order of Lenin and Order of Labor Red Banner Higher Technical School imeni Bauman. Moscow, 1956. (Dissertation for the Degree of Candidate in Technical Sciences).

SO: Knizhnaya letopis'
No. 25, 1956. Moscow

KITSKIY, B.P., kand. tekhn. nauk.

Effect of the temperature of combustion chamber walls on operating conditions of the IAAZ-204 engine. [Trudy] MVTU no.83:172-181 '58.
(Gas and oil engines) (MIRA 11:6)

ZAYTSEV, V.; LERNER, M.; GUREYEV, A.; ZABRYANSKIY, Ye.; KITSKIY, B.

New antiknock compound for gasolines. Avt.transp. 40 no.1:17-19 Ja '62. (MIRA 15:1)

(Gasoline--Antiknock and antiknock mixtures)

ANDRONIKASHVILI, E.L., akademik; BUDA, B.G.; DEVNOZASHVILI, D.S.;
KIKNADZE, G.I.; KITSMARISHVILI, E.S.; TOPSHYAN, L.S.;
CHANTURIYA, V.M.

Low-temperature loop of an IRT-2000 reactor. Soob. AN Grus.
SSR 34 no.1:45-52 Ap'64 (MIRA 17:7)

1. AN Gruzinskoy SSR (for Andronikashvili).

KITSNIK, A.; KOCH, R., kand.tekhn.nauk

Organic matter and mineral contents in the various granulometric classes of pulverized kukersite. Izv. AN Est. SSR, Ser. fiz.-mat. i tekh.nauk no.4:312-318 '64. (MIRA 18:4)

1. Institut khimii AN Estonskoy SSR.

KITSOVSKAYA, I.A.

Study of correlation between the basic neural processes in rats under the effect of SHF of various intensity. Trudy Inst. gig. truda i prof. AMN SSSR no.1:75-80 '60.

(MIRA 16:12)

GORDON, Z.V., KITOVSKAYA, I.A., and TOLGSKAYA, M.S.

All at the Institute of Labor Hygiene and Professional Diseases, Academy of Medical Sciences USSR, Moscow - "Biological effects of microwaves of small intensity"

Report to be submitted for the 4th Intl. Conf. on Medical Electronics, New York, N.Y., 16-21 July 1961

L 35862-66 EWT(l) DD

ACC NR: AP6022515 (N) SOURCE CODE: UR/0391/66/000/007/0005/0009

AUTHOR: Fukalova, P. P. (Moscow); Tolgskaya, M. S. (Moscow); Nikogosyan, S. V. (Moscow); Kitsovskaya, I. A. (Moscow); Zenina, I. N. (Moscow)

ORG: Institute of Industrial Hygiene and Occupational Diseases, AMN SSSR (Institut gigiyeny truda i profzabolevaniy AMN SSSR)

TITLE: Research data on the standardization of EMF's in the short- and ultrashort-wave ranges

SOURCE: Gigiyena truda i professional'nyye zabolevaniya, no. 7, 1966, 5-9

TOPIC TAGS: microwave, microwave biologic effect, central nervous system, UHF, human physiology, animal physiology, animal experiment, industrial hygiene

ABSTRACT: In a survey of radio and television stations and establishments which process dielectrics thermally, measurements using various dosimeters showed that field intensities around short- and ultrashort-wave sources were 8—450 v/m and 4—220 v/m, respectively. The reaction speed and accuracy were studied in personnel exposed to

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L 35862-66

ACC NR: AP6022515

these sources. Chronometric tests, observations of visual motor reactions, and work capacity were studied and are summarized in Table 1.

Table 1. Changes in the physiological functions of duty personnel in two radio stations (%)

Observed parameter	Shift									
	Evening		Day		Night					
					Station I			Station II		
	Station I	Station II	Station I	Station II	Before sleep	After sleep	End of shift	No sleep		
Latent period of positive conditioned reflexes	0,0	0,0	16,1	12,6	2,2	2,2	6,6	0,0	11,1	42,5
Subsequent inhibition	6,9	4,1	24,3	18,7	0,0	2,1	13,0	0,0	8,1	17,3
Disinhibition of differentiation	20,0	10,0	40,0	20,0	60,0	60,0	70,0	30,0	8,1	60,0
Steadiness of attention: Time	21,4	33,0	50,0	21,4	33,0	19,9	33,3	25,0	50,0	36,6
Steadiness of attention: No. of errors	1,5	1,0	2,5	1,0	3,0	3,0	4,0	2,0	2,5	4,0

It was concluded that the action of EMF's is aggravated by inefficient work-rest cycles which lead to shifts in various physiological reactions

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ACC NR: AP6022515

and the development of fatigue. To study the mechanism of the effect of EMF's, animals were exposed to 14, 88, and 69.7 Mc fields (5000 v/m intensity). Animals in the ultrashort-wave range were killed within 5 min, while those in the shortwave range died in 1 hr and 40 min. Nonthermal (no integral thermal effect such as increased body temperature) threshold intensity for the ultrashort-wave range was 150 v/m and for the shortwave range, 2250 v/m. Chronic exposure to these intensities (plus exposure to an ultrashort-wave intensity of 300 v/m) did not result in any substantial changes in body weight dynamics compared to control animals. However, a decrease in brain-stem cholinesterase activity occurred more rapidly during exposure to ultrashort waves than exposure to short waves. Both regimens decreased the excitability and weakened the inhibition process in chronically exposed rats. Such exposure also tended to depress brain biopotentials progressively. An ultrashort-wave intensity of 10 v/m and shortwave intensity of less than 50 v/m is a subthreshold irritant. Photos show the results of a cytomorphological examination of neural structures in exposed animals which revealed thickening of neural fibers, swelling and vacuolization of cell protoplasm in the thalamo-hypothalamic area and medulla oblongata, and local karyocytolysis of individual neurons. Shriveling of individual pyramid cells and individual vacuoles in neurons of the brain cortex was noted. Thus, it was found that an ultrashort-wave intensity of 150 v/m and a shortwave intensity of 2250 v/m is more than

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L 35862-66

ACC NR: AP6022515

sufficient to cause physiological and morphological changes in neural structures and that the intensity of the effect depends on wave range, field intensity, and exposure duration. On the basis of these data, a permissible exposure intensity of 5 v/m is recommended for workers around ultrashort-wave sources and 20 v/m for workers around shortwave sources. Orig. art. has: 6 figures and 1 table. [CD]

SUB CODE: 06/ SUBM DATE: 07Jan65/ ORIG REF: 017/ OTH REF: 001
ATD PRESS: 5037

Card 4/4

L 47127-66 EWT(d) IJP(c)

ACC NR: AR6016019 SOURCE CODE: UR/0271/66/000/001/B003/B003

AUTHOR: Kisel', V. A.; Kitsul, I. V.

50
B

TITLE: Trigonometric interpolation with multiple equidistant nodal points

SOURCE: Ref. zh. Avtomat. telemekh. i vychisl. tekhn., Abs. 1B20

REF SOURCE: Tr. uchebn. in-tov svyazi. M-vo svyazi SSSR, vyp. 24, 1965, 169-176

TOPIC TAGS: polynomial, interpolation, harmonic function, approximation method

ABSTRACT: A method is analyzed for plotting the trigonometric polynomials which for interpolating the values of a given function and values of its derivatives in equidistant modal points. Three cases are analyzed: when an interpolating function is of even parity, odd parity, and random. The given solution can be used for calculating the harmonic corrections, vocoders, and synthesizers, as well as equipment, the calculation of which is based on an approximation of the given function and its derivatives of trigonometric polynomials. Orig. art. has: 1 figure. [Translation of abstract] [NT]

SUB CODE: 12/

Card 1/1 afs UDC: 681.142.33.001

L 44230-66 EWT(1)/T JK

ACC NR: AP6023571 (A) SOURCE CODE: UR/0018/66/000/007/0040/0041

AUTHOR: Kiyanitsa, P. (Lieutenant general of the signal corps); Kazanov, V. (Colonel)

ORG: none

1/4
B

TITLE: Correct methods of using communications equipment

SOURCE: Voyennyy vestnik, no. 7, 1966, 40-41

TOPIC TAGS: communication equipment, military ~~administration~~, communication, ~~training~~, communication ~~procedure~~ operation, limited war communication

ABSTRACT: A lieutenant general in the Communications Corps describes correct methods of using communications equipment and mentions that in the modern combat situation and during reconnaissance information is transmitted continuously to small units. From small units to headquarters, messages are transmitted every 10 to 15 minutes. Information concerning atomic and bacteriological attacks is transmitted immediately. [WS]

6

SUB CODE: 15, 17/ SUBM DATE: none/

Card 1/1 MT

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[illegible], V.I.

Geochronological significance of the ultrabasic alkali intrusions in the Aldan Shield. Trudy Lab. geol. dokem. no.19: 228-235 '64 (MIRA 37:8)

KITSUL, V.I.

Metamorphism of carbonate rocks of the Ladoga formation. Trudy Lab. geol. dokem. no.8:370-384 '59. (MIRA 12:10)
(Ladoga region--Carbonates (Mineralogy))

ROZHKOV, I.S., KITSUL, V.I.

A deposit of platinum in the Aldan shield. Geol. rud. mestorozh. no.4:74-84 Jl-Ag '60. (MIRA 13:8)

1. Yakutskiy filial Sibirskogo otdeleniya AN SSSR.
(Aldan Plateau--Platinum)

ROZHKOV, I.S., glav. red.; KITSUL, V.I., kand. geol.-miner. nauk, otv. red.

[Petrography of the metamorphic and igneous rocks of the Aldan Shield] Petrografiia metamorficheskikh i izverzhennykh porod Aldanskogo shchita. Moskva, Nauka, 1964. 163 p. (MIRA 17:8)

1. Akademiya nauk SSSR. Yakutskiy filial, Yakutsk. Institut geologii. 2. Chlen-korrespondent AN SSSR (for Rozhkov).

KITSUL, V.I.

Grades of the progressive regional metamorphism of carbonate rocks in the Ladoga formation. Trudy Lab. geol. doken. no.11:230-239 '60. (MIRA 14:1)

(Lagoda Lake region--Rocks, Carbonate)

KITSUL, V.I.; BOGOMOLOV, M.A.

Concerning G.V.Andreev's article "Contact-infiltration skarns near carbonate bodies in the Kondersliy Massif." Izv.AN SSSR. Ser.geol. 26 no.1:99-100 Ja '61. (MIRA 15:6)
(Aldan Plateau—Skarns)
(Andreev, G.V.)

KITSUL, Vasiliy Ivanovich; SUDOVIKOV, N.G., prof., otv. red.; KALANTAROV, A.P., red. izd-va; GUSEVA, A.P., tekhn. red.

[Petrology of carbonate rocks in the Ladoga formation] Petrologiia karbonatnykh porod Ladozhskoi formatsii. Moskva, Izd-vo Akad. nauk SSSR, 1963. 170 p. (MIRA 16:5)
(Ladoga Lake region--Rocks, Carbonate)

COSTACHEL, O.; KITULESCU, I.

Experimental data on a new signification of the activity of cholinesterases. Studii cerc fiziol 6 no.1:19-26 '61.
(EEAI 10:9)

1. Institutul oncologic, Bucuresti.

(ENZYMES) (CHOLINESTERASES)